Douglas-Fir Tussock Moth

Forest Health Fact Sheet

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Douglas-fir tussock moth larva (coloration can vary)

The Douglas-fir tussock moth (DFTM; *Orgyia pseudotsugata*) is a major defoliator of Douglas-fir and true firs in the western United States. Tussock moths occur in most forests in Oregon, but episodes of severe defoliation have been mostly restricted to the Blue Mountains of northeastern Oregon as well as Klamath and Lake counties. Trees growing along exposed ridges or on less productive sites are most at risk for attack. Defoliation by this insect can cause top kill, reduce radial growth and result in up to 40% tree mortality. Outbreaks typically subside within 1-2 years. Several agencies in Oregon annually survey for DFTM population spikes via pheromone-baited traps.

Hosts

- Major: Douglas-fir; white and grand firs
- Minor: Engelmann spruce and ornamental conifers such as blue spruce

*will feed on pine and understory plants when other hosts have been stripped

Biology

Douglas fir tussock moth adults emerge from late July to November. After mating, the flightless female lays up to 350 eggs on the cocoon that she emerged from. After egg laying is complete, the female dies, leaving the eggs to overwinter attached to the cocoon. DFTM's have one generation per year. Egg hatch coincides with bud burst and shoot elongation of host trees in May and June. Young larvae gather at the tops of trees and produce silk threads that attach to foliage. These threads separate from the foliage and allow the larvae to be carried by the wind to adjacent trees.

Residual silk at the tops of trees form a small tent that is one of the first visible signs of tussock month infestation. Initially larvae feed on current year foliage then move to older foliage. Feeding occurs from June to mid-July. Maturing larvae gradually develop the tufts of hair or 'tussocks' from which they get their name. Pupation occurs from late July through August. Pupae are inside a thin, grey cocoon of silk webbing mixed with shed larval hairs.

Jerald Dewey, USFS and Jana Peterson, ODF

DFTM egg mass cocoon (inset); female (above) and male (below) adults

Damage

Isolated infestations on ornamental trees, particularly spruce, are common one or two years before a major outbreak. On forest land, outbreaks develop suddenly, cover hundreds to thousands of acres and collapse after 1 -2 years of intense defoliation. Infestation centers do not spread significantly because the female tussock moth cannot fly.

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Needle browning from DFTM feeding

Sites with severe defoliation are often dominated by host trees older than 50 years and are located on upper slopes and ridge tops. Tree defoliation by this insect is particularly destructive because larvae consume both old and new foliage. Defoliation causes foliage to turn brown, and when severe strips the crown of needles. When trees are stripped of most of their foliage, they may die or suffer top-kill. Trees that survive the outbreak are left weakened and are often killed by bark beetles two or three years later.

Human Health Concerns
Tussock moth larvae are covered with tiny irritating hairs that produce an allergic reaction in humans called 'tussockosis'. Symptoms of tussockosis can resemble those of hay fever, but more intense reactions such as welt-like rashes can occur. Because of the allergic reaction to these hairs, visitors may want to avoid campgrounds and recreation areas affected by tussock moth defoliation.

Management

DFTM population fluctuations are surveyed as part of a long-term, multi-agency trapping program that occurs every year. Population increases indicate the potential for outbreaks.

Natural
DFTM outbreaks typically collapse in 1-2 years from the combined effects of parasites, predators, disease and starvation. Birds, ants and spiders commonly prey on tussock moths.

Silvicultural
Stand susceptibility to defoliation can be mitigated by reducing Douglas-fir and true fir (in favor of pine, etc.) in stands where fire suppression and logging practices have allowed these preferred hosts to dominate. On true fir sites, non-host species such as western larch should be favored during thinning operations.

Remove struggling or damaged trees, particularly those stressed by drought, growing on poor sites (ridgetops, etc.) or with weak or thin crowns.

Do not thin stands during or immediately after an outbreak. There is no way to identify which trees will fully recover from defoliation and escape subsequent bark beetle attack.

Don Owen, CAL FIRE and Jana Peterson, ODF

Initial defoliation and silk webbing (left) and advanced defoliation (right).

Insecticidal
A pesticide application after newly hatched larvae have dispersed to new foliage and begun to feed is most effective in reducing larval populations and preserving foliage. Many biological insecticides such as *Bacillus thuringiensis kustaki* (Btk) or spinosad,.

When using pesticides, always read and follow the label

Management highlights

- Reduce host species (Douglas-fir and true fir) in favor of pine, larch, etc.
- Do not thin stands immediately after an outbreak
- Apply insecticides when newly hatched larvae have dispersed to new foliage to feed

More information:

Oregon Dept. of Forestry, Forest Health
http://tinyurl.com/odf-foresthealth
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Other references:

USFS Forest Health Protection
www.fs.usda.gov/goto/fhp/fidls
https://tinyurl.com/dougfirtussockmoth
OSU Forestry Extension
http://extensionweb.forestry.oregonstate.edu/